EQUIPMENT METERING PROCEDURE

PURPOSE OF PROCEDURE

The procedure as set forth here has been prepared at the request of REA borrowers as a suggested guide in the determination of electric energy consumption of various farm and home electrical equipment. It must be recognized at the outset that many variables make it quite difficult to get data that is average for any particular application. This procedure does not give a method of determining average electrical energy consumption of any type of electrical equipment. Its purpose is to give a method of finding the electrical energy consumed by equipment used by a representative farm consumer, classified as to type of farm, and for use in the power use and member education program of the cooperative.

The procedure for determining the average energy consumption in a particular electrical application is much more complicated. Such a procedure, if it provides reasonably accurate data, will involve considerably more effort, time, and expense as well as a careful analysis of the basic data to determine its reliability. If any cooperative desires to determine the average energy consumption of farm and home electric equipment on its system, a procedure will be developed and furnished upon request to fit the individual situation.

SELECTING REPRESENTATIVE FARMS

1. Definition of Representative Farm:

A representative farm is one which is, in general, typical of the area being considered. It is a farm that is considered typical of the area from the following standpoints:

a. Size of family
b. Size of farm
c. Farm income
d. Farm buildings
e. Number of livestock
f. Poultry enterprise
g. Available facilities for farm work

2. Classification of Farms

Farms are classified by groups according to the enterprise that contributes the major portion of the farm income; for example, a dairy farm would be a farm where the major income is derived from dairying. Farms are classified in the following groups:

a. General Farm
b. Dairy Farm
c. Poultry Farm
d. Livestock Farm
e. All-other-crop Farm
f. Vegetable Farm or Truck Farm
g. Horticulture-specialty Farm
h. Fruit and nut Farm
i. Forest Products Farm

For further explanation of classsification, refer to the "United States Census of Agriculture" which may be found in most county agricultural workers' offices.

3. Method of Selection

a. Representative farms in each classification comprising a major portion of the farm consumers on the system should be selected. On most systems only farms of the following classifications need be selected: General, Dairy, Poultry, Livestock, and All-other-crop.

b. In the selection of representative farms in each major classification, persons familiar with the characteristics of the farms in the cooperative area should be consulted. Such persons are: County Extension

Agents, Vocational Agriculture Teachers, other agricultural workers, and rural community leaders. The farms on which electrical equipment is to be metered should be selected according to the opinions of these qualified persons.

c. It is recommended that at least five representative farms in each major classification be selected in each county served by the cooperative. A list of the representative farms should be prepared and made a part of the power use files of the cooperative. This will afford a reference to possible locations for metering of various pieces of farm and home electric uses.

4. Number of Meter Installations

The number of representative farms on which equipment may be metered depends on the ability of the cooperative to provide metering equipment and personnel for the tests. As a minimum, at least one farm of each major classification should be metered. It is desirable to meter at least one farm of each major type in each county in the cooperative area, since the more neighborly the data, the better it will be received by farm consumers when the story of electric energy consumption is presented to them.

METHOD OF METERING

1. Classifying Equipment

As nearly all household appliances and farm equipment commonly served by an REA cooperative operate at 230 volts or 115 volts, these two voltage classifications will be used. Generally "plug-in" equipment operates at 115 volts, and equipment using separate circuits and special plug caps and receptacles operates at 230 volts.

2. Meter Mounting Boards

To aid in metering, a meter mounting board of the types shown on Inclosure #1 can be used on most pieces of equipment. Since type S, 5 amp., 2 wire or type S, 15 amp., 3 wire, single phase meters are available at most cooperatives, this equipment may be used for the metering tests. The meter should be installed in series with the device being metered. For metering "plug-in" devices, a plug cap and a receptacles of proper design should be attached to pigtail cords leading from the load side and the line side of the meter. The type and size of wire, and the type of plug caps and receptacles used must meet voltage, current carrying capacity, and safety specifications specified by the National Electrical Code. In some cases, for example water heaters, the cords are best wired directly into the circuit. Where separate circuits feed the individual appliance, the best location for the meter is often at the load center. Meters placed out-of-doors should be equipped with weatherproof fittings, and connected through plugs and receptacles made for outdoor use.

All meters should be placed where they can be conveniently read, and should not be a nuisance to the consumer. Metering boards used indoors should have a sufficiently pleasing appearance so they will not be annoying to the consumer.

3. Meters with Demand Registers

Watthour meters with indicating demand registers which show both continuous and maximum demand are available. They may be used if the co-op wants this type of information. These registers are sufficiently accurate for the tests that most co-ops will want to make. Such information will prove helpful in estimating KW demand to be expected for various types of electrical equipment utilized on the system.

4. Length of Metering Period

Meters should remain on most major appliances and equipment for one continuous year. Seasonal equipment may be metered for one operating season. Shorter periods of time will not give proper recognition to variations in seasonal use and other fluctuations. The table below lists equipment which is considered important in metering, as well as the suggested length of metering period:

Equipment	Duration of Metering Period
Range	12 months
Freezer	12 months
Refrigerator	12 months
Walk-in Refrigerator	12 months
Water Heater	12 months
Ironer	12 months
Washer, conventional	12 months
Washer, automatic	12 months
Water Pump	12 months
Milk Cooler	12 months
Milking Machine	6 months
Cream Seperator	6 months
Feed Grinder	12 months
Hay Drier	Per season
Poultry House Lighting	Per season
Poultry Water Warmer	Per season
Stock Tank Heater	Per season
Furnace (Motors & Controls)	Per season

5. Information to be Collected when Meters are Installed

Certain information on each installation will be needed in addition to the regular meter readings. Most of this information can be obtained at the time the meters are installed. The information needed will depend on the appliances and equipment being metered, the reasons for metering, the prevailing types of farming in the area, and other similar factors. In general, this information should include:

a. Name and address of the consumer
b. Number and age of children
c. Number of other people living with the family
d. Type of farm
    (1) Acres
    (2) Principal income derived from:
        crops
        poultry
        dairy
        livestock
        other
e. Name plate data on each piece of equipment being metered might include:
    (1) Type of equipment
    (2) The manufacturer's name and address
    (3) The capacity or size of the equipment where pertinent
    (4) Wattage rating
    (5) Horsepower
    (6) Amperage
    (7) Voltage
    (8) Number of Phases
f. Other comments regarding location, use, whether equipment is controlled (such as water heaters), etc.

6. Meter Record Form

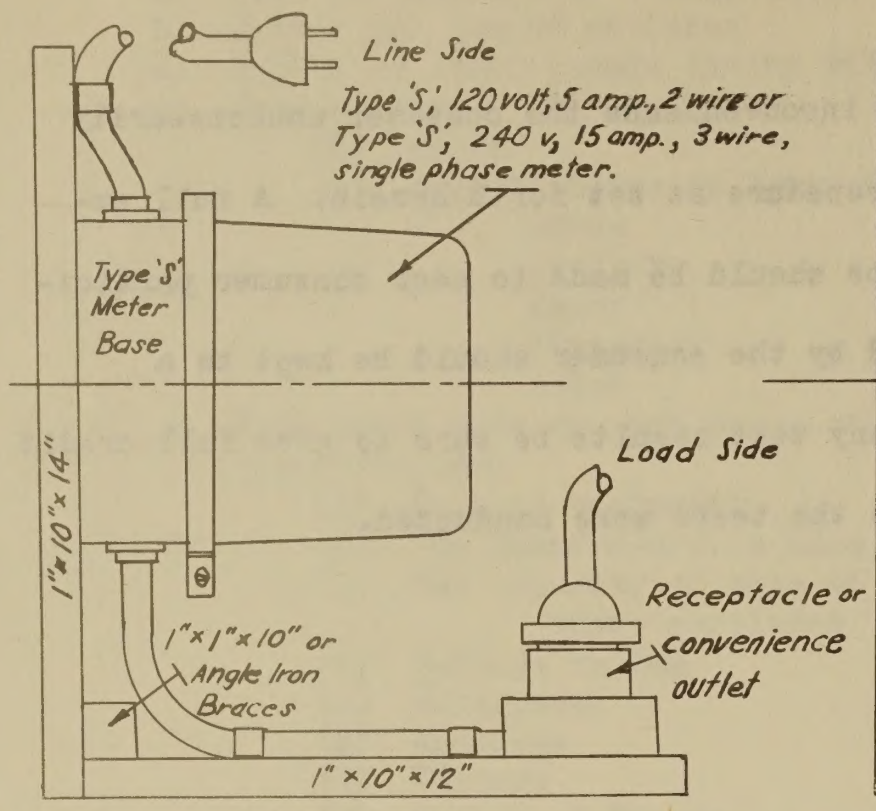
The form attached as Inclosure #2 may be used for keeping records on each individual installation. It should be kept up to date by the cooperative, and the meter should be read by a representative of the cooperative. This is recommended since greater dependability can be procured if the cooperative performs this activity. If equipment being metered is farm equipment for product processing a form should be furnished the consumer so that the number of units processed may be recorded. Such records are considered important for the following types of farm electrical equipment:

Equipment	Unit to be Recorded
Milk Cooler	Gallons of Milk Cooled
Milking Machine	Number of Cows Milked
Cream Separator	Number of lbs. of Milk Separated
Feed Grinder	Number of lbs. & Type of Grain
Stock Tank Heater	Number of Stock Watered
Hay Drier	Tons of Hay Processed

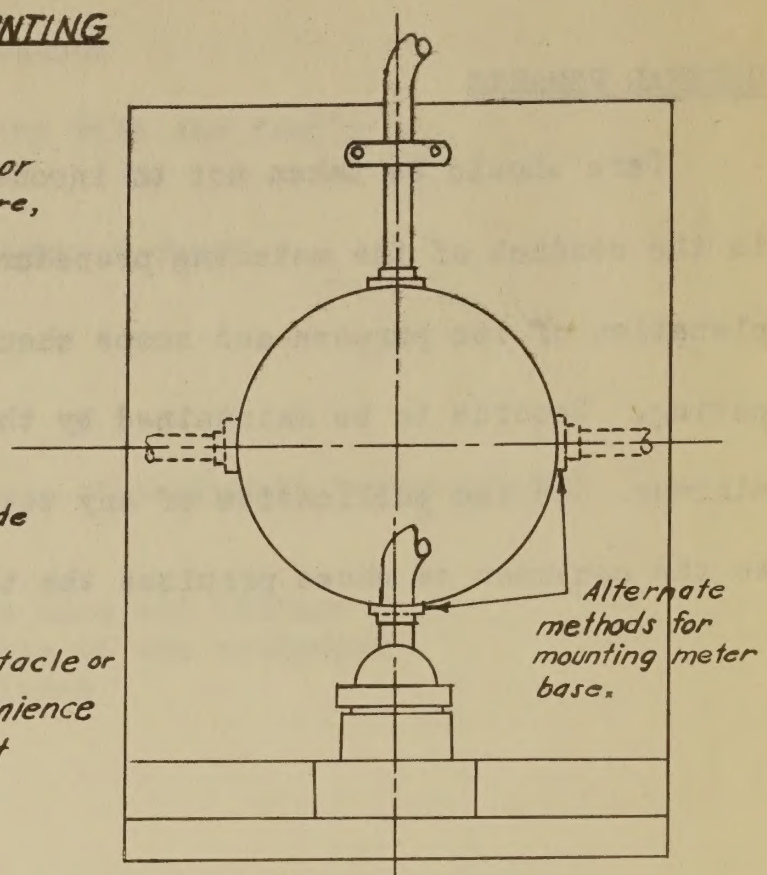
GENERAL REMARKS

Care should be taken not to inconvenience the consumer unnecessarily in the conduct of the metering procedure as set forth herein. A full explanation of its purpose and scope should be made to each consumer participating. Records to be maintained by the consumer should be kept to a minimum. In the publication of any test results be sure to give full credit to the consumer on whose premises the tests were conducted.

FOR SHELF MOUNTING

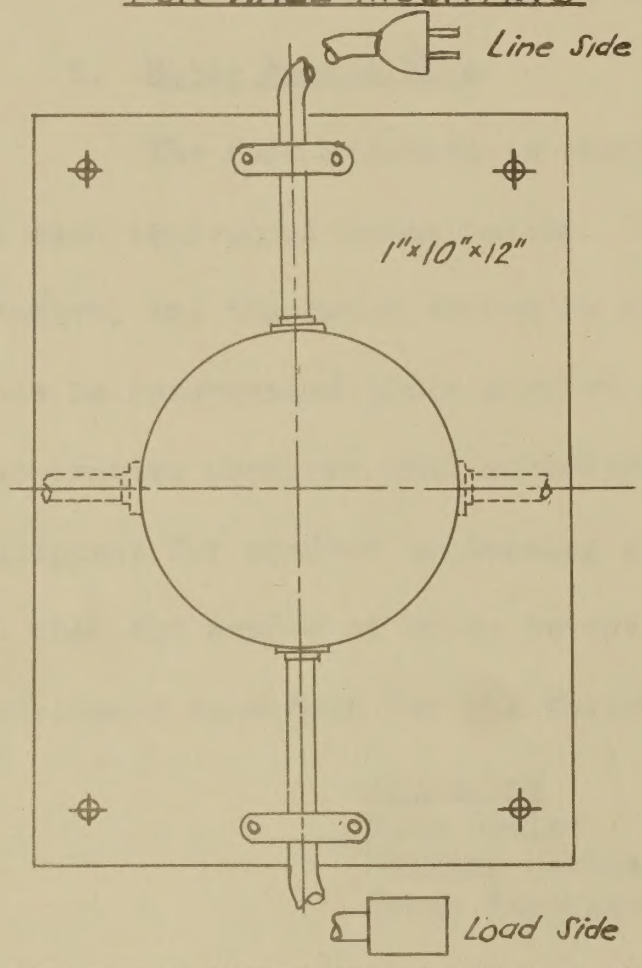


SIDE VIEW

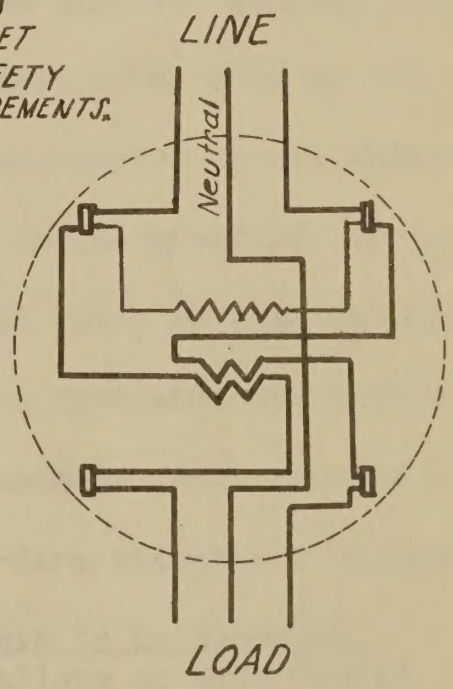


FRONT VIEW

FOR WALL MOUNTING



ALL WIRING, PLUGS, AND RECEPTACLES SELECTED TO MEET EQUIPMENT SAFETY AND LOAD REQUIREMENTS.



WIRING DIAGRAM
For 240 v, 3-wire

METER MOUNTING BOARD

Date: 3-30-49

A2831

EQUIPMENT METERING STUDY

_____
(name of Co-op)

Meter Record Form

Name_____

Address _____

Equipment _____

Make _____ Type_____ Location_____

Voltage_____ Watts_____

Capacity or Size_____ Age_____

Date Meter Installed _____ Date Test Completed_____

	Date Read	Units Processed*	Meter Reading	KWH	Max. Demand
Initial					
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
Total					

*Where farm equipment is metered the "Units Processed" should be recorded, for example:

(1) If milking machine: number of cows milked
(2) If cream separator: number of pounds of milk processed
(3) If feed grinder; number of pounds and kind of grain ground

Inclosure #2